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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,061	07/24/2003	Dun-Nian Yaung	TSM03-0243	9744
25962	7590	12/01/2004	EXAMINER	
SLATER & MATSIL, L.L.P. 17950 PRESTON RD, SUITE 1000 DALLAS, TX 75252-5793			SCHILLINGER, LAURA M	
			ART UNIT	PAPER NUMBER
			2813	

DATE MAILED: 12/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/626,061	Applicant(s) YAUNG, DUN-NIAN	
	Examiner Laura M Schillinger	Art Unit 2813	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) 1-6 and 16-23 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 7-9 and 12-15 is/are rejected.
- 7) ☒ Claim(s) 10 and 11 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7/24/03</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-6, 16-23, drawn to a device, classified in class 257, subclass 750.
- II. Claims 7-15, drawn to a method, classified in class 438, subclass 624.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the STI can be removed by wet or dry etching processes.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II and vice versa, restriction for examination purposes as indicated is proper.

This application contains claims directed to the following patentably distinct species of the claimed invention:

Group I:

Species 1, claims 1-6, pertaining to a photodiode;

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Species 2, claims 16-23, pertaining to a semiconductor device.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, there is no generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

During a telephone conversation with Brian Carlson on 11/19/04 a provisional election was made without traverse to prosecute the invention of Group II, claims 7-15. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-6, 16-23 are

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withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Objections

Claims 10-11 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 7-9,12-15 are rejected under 35 U.S.C. 102(b) as being anticipated by Thei et al ('249).

Thei teaches the following method as cited below:

7. A method of manufacturing a photodiode sensor, comprising:

forming a well in a substrate (Col.5, lines: 1-7);

forming a shallow trench isolation (STI) element at least partially in the well (Col.5, lines: 5-10);

removing a portion of the STI element to form STI regions opposing an exposed portion of the well (Col.5, lines: 10-23);

forming a floating node in the exposed portion of the well (Col.7, lines: 10-20 and Fig.4 (G and /or 19'));

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forming a borderless contact buffer layer over at least the floating node and along sidewalls of the STI regions (Fig.4 (22 and/or 24));

forming an interlevel dielectric layer over the borderless contact buffer layer (Fig.4 (28)); and

forming a borderless contact extending through the interlevel dielectric layer and the borderless contact buffer layer to the floating node (Fig.5 (30)).

8. The method of Claim 7 wherein the borderless contact buffer layer is selected from the group consisting of: SiON, SiN, and combinations thereof (Fig.4 (24) and Col.6, lines: 40-45).

9. The method of Claim 7 wherein the dielectric layer is selected from the group consisting of: silicon dioxide, low dielectric material, and combinations thereof (Col.6, lines: 50-60).

12. The method of Claim 7 wherein the well is doped with an n-type impurity and the floating node is doped with an n-type impurity (Col.7, lines: 15-30).

13. The method of Claim 7 wherein the floating node is formed by implanting ions through an opening between the opposing STI regions (Fig.4 (G and 19')).

14. The method of Claim 7 wherein the portion of the STI element is removed by a dry etching process (Col.5, lines: 5-23).

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15. The method of Claim 7 further comprising forming a conductive interconnect on the dielectric layer and contacting the borderless contact (Col.7, lines: 55-63).

Allowable Subject Matter

The following is a statement of reasons for the indication of allowable subject matter:

Thei et al suggests the method of claim 7 above however, prior art fails to teach nor suggest modifying the Thei reference to further include a specific refractive index as recited by claims 10 and 11 in combination with the limitations of claim 7, therefore claims 10-11 contain allowable subject matter.

10. The method of Claim 7 wherein a second refractive index of the borderless contact buffer layer is between a first refractive index of the dielectric layer and a third refractive index of the floating node.

11. The method of Claim 7 wherein the dielectric layer has a first refractive index of between about 1.3 and about 1.5, the borderless contact buffer layer has a second refractive index of between about 1.8 and about 2.5, and the floating node has a third refractive index of greater than about 3.

Conclusion

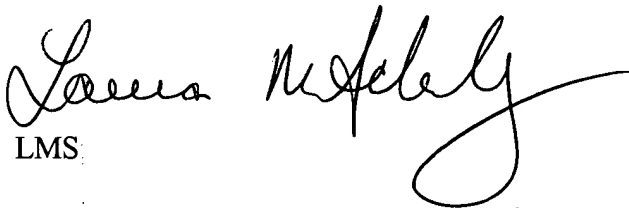
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M Schillinger whose telephone number is (571) 272-1697.

The examiner can normally be reached on M-T, R-F 7:00-5:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carl W Whitehead, Jr. can be reached on (571) 272-1702. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


LMS

11/27/04